Claims:

1. A method for measuring a rotating angle by an optical encoder assembly comprising a rotating optical disk with a pattern of transparent and absorbent sections, a patterned mirror and one or more optical guide means, wherein an optical beam emitted from a light source is distributed over a substantial part of the said rotating optical disc by the said optical guide means, light rays of the said optical beam are propagated through the transparent sections of the said optical disc to become incident upon the said mirror, and the amount of light reflected by the said mirror and propagated backwards through the said rotating optical disc into the said optical guide is measured, whereby a signal is created depending on the rotation angle and indicating the said rotation angle.

2. A method for measuring a rotating angle by an optical encoder assembly according to claim 1 wherein the said pattern of transparent and absorbent sections is a circular pattern and the said optical guide means is a cylindrical optical guide with a transparent peripheral wall that is optically designed to confine the light rays within itself such that the said optical beam travels through the said peripheral wall to be emitted from the said cylindrical optical guide through a terminal peripheral rim at the end of the said transparent peripheral wall and distributed over the circumference of the said optical disk as a circle of light that overlies the said circular pattern.

3. A method for measuring a rotating angle by an optical encoder assembly according to claim 1 comprising a first cylindrical optical guide that is installed within the hollow inner space of a second cylindrical optical guide such that the said first and second cylindrical optical guides have a common symmetry axis and each of the said cylindrical optical guides has a peripheral wall that is optically designed to confine the light rays within itself such that a pair of optical beams emitted from a light source travel

through the peripheral walls of the said first and second optical guides respectively to be emitted from the said cylindrical optical guides through their respective terminal peripheral rims and distributed over the circumference of the said rotating optical disc whereby two concentric circles of light are incident on two concentric patterns of absorbent and transparent sections provided on the said rotating optical disk, light rays from the said concentric circles of light are propagated through the said transparent sections of the said optical disk to become incident upon the said mirror, and the amount of light reflected by the said mirror and propagated backwards through the said rotating optical disc into each of the said optical guides is measured, whereby a signal is created depending on the rotation angle and indicating the said rotation angle as well as the direction of rotation.

4. A method for measuring a rotating angle by an optical encoder assembly according to claim 1 wherein the said pattern consists of reflective and absorbent sections and only the rays of light incident on the said reflective sections are returned to the optical guide means such that the amount of light output by the said optical guide means depends on the relative positions of the rotating optical disk and the static optical mirror.

5. A method for measuring a rotating angle by an optical encoder assembly according to claim 1 wherein the said pattern is a circular pattern of reflective and absorbent sections that is disposed at the same radial position as the radial position of the circular pattern of transparent and absorbent sections on the optical disk whereby only the rays of light incident on the said reflective sections are returned to the optical guide means such that the amount of light output by the said optical guide means depends on the relative angular positions of the rotating optical disc and the static optical mirror.

6. A method for measuring a rotating angle by an optical encoder assembly according to claim 3 wherein the said mirror has two concentric circular patterns of reflective and absorbent sections, the said concentric circular patterns being disposed on the said mirror at the same radial positions as

the radial positions of the two concentric circular patterns of transparent and absorbent sections on the optical disk, whereby only the rays of light incident on the said reflective sections are returned to the said first and second optical guide means such that the amount of light output by each of the said optical guide means depends on the relative angular positions of the rotating optical disc and the static optical mirror.

7. A method for measuring a rotating angle by an optical encoder assembly according to claim 3 wherein the light beams emerging from the said cylindrical optical guides are first propagated through a static optical disk that is disposed between the said cylindrical optical guides and the said rotating optical disc and then through the said rotating optical disk and a plain mirror is used to reflect the incident rays of light backwards to the said cylindrical optical guides.

8. A method for measuring a rotating angle by an optical encoder assembly according to claim 3 wherein the light beams emerging from the said cylindrical optical guides are first propagated through a static optical disk and then through the said rotating optical disk and the said rotating optical disk is attached to the surface of a plain mirror that reflects the incident rays of light backwards to the said cylindrical optical guides.

9. A method for measuring a rotating angle by an optical encoder assembly according to claim 1 wherein a bundle of optical fibers is used such that one optical fiber emits light into the optical guide means and other optical fibers collect light emitted from the said optical guide means.

10. An Optical Encoder assembly for indicating the angular position of a rotary shaft, comprising the following elements having a common symmetry axis:

a. A rotary shaft

b. a rotating optical disc centrally attached to the said rotary shaft and perpendicularly inclined relative to the said rotary shaft, the said rotating optical disk having a pattern of alternating light absorbing and transparent surfaces;

c. an optical guide means facing a front side of the said rotating optical disk for emitting light rays in the direction of the said optical disk and receiving light rays from the direction of the said optical disk;

d. and a mirror disposed behind the said optical disk distally to the said optical guide means and inclined in parallel to the said rotating optical disk such that a reflective face of the said mirror is facing a back side of the said rotating optical disk.

11. An Optical encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said Optical encoder assembly further comprises an optical fiber entering the said optical guide means at a light entrance surface for leading light beams emitted from a light source into the said optical guide and leading light beams output by the said optical guide out of the said optical guide to an electronic surface, the middle line of the said optical fiber being aligned with the said symmetry axis at the said light entrance surface.

12. An Optical Encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said pattern of transparent and absorbent sections on the said rotating optical disk is a circular pattern and the said optical guide means is a cylindrical optical guide with a terminal peripheral rim.

13. An Optical Encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said optical encoder comprises a bundle of optical fibers.

14. An Optical Encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said pattern of transparent and absorbent sections on the said rotating optical disk consists of two concentric circles of alternating absorbent and transparent sections, and the said optical encoder assembly comprises a first cylindrical optical guide that is installed within the hollow inner space of a second cylindrical

optical guide such that the said first and second cylindrical optical guides have a common symmetry axis and each of the said cylindrical optical guides has a peripheral wall that ends in a terminal peripheral rim facing the said rotating optical disk.

15. An optical encoder assembly for indicating the angular position of a rotary shaft according to any of claims 10 – 14 wherein the said mirror is a static mirror with a pattern of reflective and absorbent sections.

16. An optical encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said mirror has a circular pattern of reflective and absorbent sections that is disposed at the same geometrical position as the circular pattern of transparent and absorbent sections on the optical disk.

17. An optical encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said mirror has two concentric circular patterns of reflective and absorbent sections, the said concentric circular patterns being disposed at the same geometrical positions as the two concentric circular patterns of transparent and absorbent sections on the optical disk.

18. An optical encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein the said mirror has a retro-reflective surface.

19. An optical encoder assembly for indicating the angular position of a rotary shaft according to claim 10 wherein on the back surface of the said disk a retro-reflective surface consisting of two annular V shaped protrusions extending around the circumference of the said disk is provided.

20. An optical encoder assembly for measuring a rotating angle according to claim 10 wherein a static optical disk is disposed between the said cylindrical optical guides and the said rotating optical disc and a plain mirror is used to reflect the incident rays of light backwards to the said cylindrical optical guides.

21. An optical encoder assembly according to claim 18 wherein one or more light sources are positioned behind the said rotating optical disk and the said patterned static optical disk and light passes through the COGs from the direction of the said rotating optical disk and the said patterned static optical disk to the said light entrance surfaces of the said COGs.

22. An optical encoder assembly for measuring a rotating angle according to claim 20 wherein the said rotating optical disk is attached to the surface of the said plain mirror that reflects the incident rays of light backwards to the said cylindrical optical guides.

23. An optical guide comprised of a hollow body enclosed by a transparent surrounding wall such that the said optical guide has a hollow inner space, the said transparent surrounding wall characterized in that it is optically designed to confine rays of light emitted into the said optical guide, the said transparent surrounding wall having a terminal peripheral rim of circular shape for receiving or emitting a light beam at a first end of the said optical guide and a light entrance surface for receiving or emitting a light beam at a second end of the said optical guide.

24. An optical guide according to claim 23 wherein the said light entrance surface receives light beams through one or more optical fibers such that the median lines of the said optical fibers are aligned with the symmetry axis of the said cylindrical optical guide at the said light entrance surface.

25. A cylindrical optical guide comprised of a hollow cylindrical section extending into a hollow funnel shaped section, the said sections enclosed by a transparent surrounding wall such that the said cylindrical optical guide has a hollow inner space, the said transparent surrounding wall characterized in that it is optically designed to confine rays of light emitted into the said Cylindrical optical guide, the said transparent surrounding wall having a terminal peripheral rim at a first end of the said cylindrical optical guide and a light entrance surface at a second end of the said cylindrical optical guide.

26. An optical guide according to claim 25 wherein the said light entrance surface receives light beams through one or more optical fibers such that the median lines of the said optical fibers are aligned with the symmetry axis of the said cylindrical optical guide at the said light entrance surface.

27. An optical guide according to claim 23 wherein on said terminal peripheral rim of the said optical guide alternating emitting/receiving and non – emitting/receiving sections are provided.

28. A cylindrical optical guide according to claim 27 wherein the said emitting/receiving sections are sections with a straight perimeter whereas the non – emitting/receiving sections have a perimeter that is inclined at a suitable angle that causes reflection of light rays passing through the said perimeter.